

DEQ in the Classroom: Create a Temperature Inversion



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Grade Level:

6th Grade

Objective:

Students will create a temperature inversion and observe how pollutants react in this situation.

Materials:

- ✓ 2 Aquariums or 2 large glass jars
- ✓ Plastic bags
- ✓ Food coloring
- ✓ Hot plate
- ✓ Pin
- ✓ Water
- ✓ Ice

Background:

Typically, warm air rises and cold air sinks, causing the air around us to mix and move. Winds continually disperse pollutants released into the air.

A temperature inversion is a layer of cold air on top of a layer of warmer air that traps the warm air underneath. In this situation, the air masses do not move. The air does not mix. Pollution from cars, industry, fires and other sources becomes trapped in the warmer layer close to the earth's surface.

Procedures:

To create a normal atmospheric condition, heat a pan of water on a hot plate and add a few drops of food coloring to the water. Fill one of the aquariums about three-fourths full of cold water. Add several ice cubes. Fill one of the plastic bags half full with the warm colored water. This bag will represent the air pollution. Seal the plastic bag so that there is no air in the bag. Remove the ice cubes from the aquarium. Lower the bag with the warm colored water into the cold, colorless water in the aquarium. Without disturbing the water in the aquarium, poke a hole in the bag with the pin and observe the interaction of the warm water with cold water. What happens? Does the water mix freely?

To simulate a temperature inversion, add several ice cubes and several drops of food coloring to a pot of water. In another container, heat several quarts of water and then fill the second aquarium about three-fourths full. Fill the second plastic bag with the cold, colored water about half full, and seal it so that there is no air in the bag. This bag will represent air pollution. Lower the bag with the cold, colored water into the aquarium filled with the colorless, warm water. Without disturbing the water in the aquarium, poke a hole in the bag with the pin and observe the interaction of the warm and cold water. What happens? How does the water move? How is it different from the first aquarium and normal atmospheric conditions?

Evaluation:

Students will write an essay describing their observations and explaining a temperature inversion.

Acknowledgements:

Gilbert D. Perez, University of Texas at El Paso TES Course, 1995.
Texas Natural Resource Conservation Commission. November 1995.